

**To:** McQueen, Jacqueline[McQueen.Jacqueline@epa.gov]  
**From:** Walt Sanders  
**Sent:** Wed 5/13/2015 7:18:21 PM  
**Subject:** FW: Meeting Request on possible study on safety of synthetic turf and crumb rubber  
Vanderslice (ASHTO) letter.pdf

Jackie,

I'm not sure if Barnes passed this onto you but you should have a copy of the letter we sent to Bob Vanderslice on Friday.

Walt

**From:** Walt Sanders [mailto:wsanders@vmgthehill.com]  
**Sent:** Friday, May 08, 2015 11:55 AM  
**To:** 'rvanderslice@astho.org'  
**Cc:** 'Johnson, Barnes'; 'Heard Smith'; 'Rom Reddy'; 'Darren Gill'  
**Subject:** Meeting Request on possible study on safety of synthetic turf and crumb rubber

Dear Mr. Vanderslice,

My firm has been working with the synthetic turf industry, EPA, CPSC and other Federal and state agencies on the safety of synthetic turf and crumb rubber. We met with Barnes Johnson and other EPA officials last week to update EPA on the progress of the industry on the safety issue and on what further studies could be undertaken to explore whether or not there is a relationship between cancer and crumb rubber. Current research studies already have concluded there is not such a relationship. However, during our meeting, Mr. Johnson suggested that we reach out to you at ASTHO to see what your organization could do to help facilitate a broad epidemiological study on the cancer issue. I have attached a letter signed by three synthetic turf companies – *FieldTurf*, *Sprinturf* and *AstroTurf*, which comprise well over 70 of the market share of the industry, formally requesting ASTHO's participation in this effort.

In their letter, the companies are requesting that you provide some dates and times the week of May 18 where they could meet with you to discuss this issue further.

Please let me know if you need any further information regarding this matter.

Walt A. Sanders

Vice President Law & Government Affairs

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May 7, 2015

Robert Vanderslice, Director for Environmental Health  
The Association of State and Territorial Health Officials  
2231 Crystal Drive, Suite 450  
Arlington, VA 22202

Dear Mr. Vanderslice:

We represent the large majority of the synthetic turf industry working with Federal agencies and the states on the safety of synthetic turf and crumb rubber. We began working with the U.S. Consumer Product Safety Commission (CPSC) in 2008 as a result of concerns expressed by the Governor of New Jersey when the NJ Department of Health discovered the presence of lead chromate in turf blades. CPSC conducted limited testing on samples of synthetic turf and concluded that the lead levels detected did not create a health risk for children playing on the fields. U.S. EPA also conducted an analysis of the chemical content of crumb rubber used as infill for synthetic turf fields, and concluded that the chemicals contained in crumb rubber did not create a health hazard. Since that time, the synthetic turf industry has conducted over 50 scientific studies on the safety of turf and crumb rubber, a summary of which is enclosed.

Regrettably, recent press reports alleging there is a relationship between cancer and crumb rubber have created heightened public concern and confusion in the marketplace where synthetic turf fields are installed.

A very recent study on the safety of synthetic turf conducted by the Connecticut Department of Public Health (CDPH) responded to these press reports. The CDPH comprehensive study covered carcinogens that are known to be in recycled tires and the crumb rubber used to cushion fields. The study found there to be very little exposure of any substances, carcinogenic or not, in the vapors and dust that these fields generate under active use, summer conditions. The study found that background levels of chemicals in urban and suburban air from heating sources and automobile traffic are much more significant sources of airborne carcinogens. CDPH sampled 5 fields (4 outdoor and 1 indoor) of different ages and composition suggests that the results can be generalized to other fields, a conclusion supported by the fact that results were similar to what was found in California, USEPA and European studies.

The Connecticut Department of Health report concluded:

“...Federal and state authorities have taken seriously the concerns that artificial turf fields may present a health risk due to contaminants in recycled rubber. The best way to investigate these concerns is via an exposure investigation.

Studies conducted in Connecticut and elsewhere have shown a very low exposure potential, less than from typical outdoor sources of air pollution. The current news reports of a list of soccer players with cancer do not constitute a correlation or causality and thus raises a

concern that currently lacks scientific support. Thus, the CT DPH position expressed in 2011 at the conclusion of the Connecticut study, that outdoor artificial turf fields do not represent an elevated health risk, remains unchanged.

A further recent analysis by a former MIT research professional Laura C. Greene (attached) concluded:

Overall, then, for several reasons, I find no reliable basis for the notion that crumb rubber in-filled synthetic turf fields pose a significant risk of cancer. Several groups of investigators, from academia, government, and consulting firms, have performed environmental monitoring and/or modeling studies of crumb rubber and synthetic turf fields, and have reached the same conclusion.

Notwithstanding these studies and analysis, a broader epidemiological study on the possible relationship between cancer and crumb rubber could eliminate any doubts where there is a link between cancer and crumb rubber. In fact, at a recent meeting with Barnes Johnson, Director, Office of Resources Conservation and Recovery at EPA, Mr. Johnson suggested that we might reach out to the ASTHO to inquire about the possibility if a broader epidemiological study would be feasible.

We are following up on Mr. Johnson's advice and seeking your counsel about how such a study might be conducted, the resources involved and the timing of such a study.

As we stated in our enclosed letter to Mr. Johnson, the synthetic turf industry is ready and willing to work with EPA and ASTHO to assist in whatever manner to make such a study a success.

Could you please provide our group with some possible dates/times the week of May 18 so we could discuss the matter with you?

Please let us know how we can help.

Sincerely,



Darren Gill  
Vice-President, Marketing  
FieldTurf



Rom Reddy  
Managing Partner  
Sprinturf



Heard Smith  
President  
Astroturf



Enclosures

Cc: Barnes Johnson

# STATE OF CONNECTICUT

## DEPARTMENT OF PUBLIC HEALTH

Jewel Mullen, M.D., M.P.H., M.P.A.  
Commissioner



Dannel P. Malloy  
Governor  
Nancy Wyman  
Lt. Governor

**EHS Circular Letter #2015-02**  
**(Follow up to Circular Letter #2014-26a)**

DATE: January 20, 2015

TO: Local Health Departments and Districts

FROM: Brian Toal, Gary Ginsberg  
Environmental and Occupational Health Assessment

RE: Recent News Concerning Artificial Turf Fields

**Brief Video Clip for Local Health Departments – *Click Here* →**



This letter and video clip are being sent to update you regarding the news story that has circulated since last spring regarding potential cancer risks at artificial turf fields. Various media outlets have continued to run this story and a number of local health departments have inquired as to its validity. Since many Connecticut towns have installed or are considering artificial turf fields an elevated cancer risk would be an important consideration. However, this news story is still based upon very preliminary information and does not change CTDPH's position that outdoor artificial turf fields do not represent an elevated health risk.

The Connecticut Department of Public Health has evaluated the potential exposures and risks from athletic use of artificial turf fields. Our study of 5 fields in Connecticut in 2010-2011 was a comprehensive investigation of releases from the fields during active play. This study was conducted as a joint project with the CT DEEP and the University of CT Health Center and was peer-reviewed by the Connecticut Academy of Science and Engineering. Our study did not find a large amount of vapor or particle release from the fields confirming prior reports from Europe and the US. We put these exposures into a public health context by performing a risk assessment. Our risk assessment did not find elevated cancer risk. These results have been published as a set of 3 articles in a peer review journal and are available on the DPH artificial turf webpage (<http://www.ct.gov/dph/cwp/view.asp?a=3140&q=464068> ).

The news story suggests soccer players and especially goalies may have an elevated cancer risk from playing on artificial turf fields. This is based upon anecdotal observations of a university soccer coach (<http://www.komoneews.com/news/local/Soccer-coach-Could-field-turf-be-causing-cancer-259895701.html> ). Reportedly the coach is developing a list of soccer players who have contracted cancer. However, the types of cancer are undocumented and so it is impossible to say whether they



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represent a common effect and there has been no reporting on how long the goalies played on artificial turf fields to see if there was plausible exposure and latency. There are many reasons why someone collecting a list of cancer cases may appear to find a cluster including the fact that when you have a single-minded focus on finding cases you do not capture all the non-cases that would tend to disprove the cluster. Documentation of an increased rate in soccer players would require an epidemiological study in which the total number who play on turf fields in a given region was also known so that a cancer rate could be established and compared to those that do not play on artificial turf fields. The current news report does not constitute epidemiological evidence and thus is very preliminary.

Our risk assessment did cover carcinogens that are known to be in recycled tires and the crumb rubber used to cushion fields. Once again, we found there to be very little exposure of any substances, carcinogenic or not, in the vapors and dust that these fields generate under active use, summer conditions. Background levels of chemicals in urban and suburban air from heating sources and automobile traffic are much more significant sources of airborne carcinogens. The fact that we sampled 5 fields (4 outdoor and 1 indoor) of different ages and composition suggests that the results can be generalized to other fields, a conclusion supported by the fact that results were similar to what was found in California, USEPA and European studies. Our study did not evaluate ingestion of the crumb rubber itself as players are unlikely to ingest an entire rubber pellet. However, two studies, one in California and one at Rutgers University did evaluate the cancer risk if children ingested a mouthable chunk of playground rubber (10 gram), using laboratory extraction methods to estimate the amount of chemicals that might become available in the stomach and absorbed into the body. Both studies found very low cancer risk from this scenario (Cal OEHHA 2007; Pavilonis et al. 2014). Thus, CT DPH finds no scientific support for a finding of elevated cancer risk from inhalation or ingestion of chemicals derived from recycled tires used on artificial turf fields. US EPA has a similar position: "At this point, EPA does not believe that the field monitoring data collected provides evidence of an elevated health risk resulting from the use of recycled tire crumb in playgrounds or in synthetic turf athletic fields."

(<http://www.epa.gov/epawaste/conservation/materials/tires/health.htm>)

In summary, federal and state authorities have taken seriously the concerns that artificial turf fields may present a health risk due to contaminants in recycled rubber. The best way to investigate these concerns is via an exposure investigation. Studies conducted in Connecticut and elsewhere have shown a very low exposure potential, less than from typical outdoor sources of air pollution. The current news reports of a list of soccer players with cancer does not constitute a correlation or causality and thus raises a concern that currently lacks scientific support. Thus, the CT DPH position expressed in 2011 at the conclusion of the Connecticut study, that outdoor artificial turf fields do not represent an elevated health risk, remains unchanged. For further information please contact Brian Toal or Gary Ginsberg at 860-509-7740.

## References

California OEHHA 2007. Evaluation of Health Effects of Recycled Waste Tires in Playground and Track Products. Prepared for the California Waste Management Board, January, 2007.

Pavilonis BT, Weisel CP, Buckley B, Lioy PJ. 2014. Bio accessibility and Risk of Exposure to Metals and SVOCs in Artificial Turf Field Fill Materials and Fibers. Risk Anal. 34: 44-55.

C     Suzanne Blancaflor, M.S., M.P.H., Chief  
       Environmental Health Section  
       Ellen Blaschinski, R.S., M.B.A., Chief  
       Regulatory Services Branch

## Memorandum

To: Phil Barlow, Shaw Industries



From: Laura C. Green, Ph.D., D.A.B.T.

Date: March 4, 2015

Subject: Assessment of recent media reports of cancer among soccer players using synthetic turf fields

Thank you for this opportunity to present my assessment of a possible cluster of cancer-cases among soccer players using synthetic turf fields, which has been the subject of recent media reports.

In what follows, I begin by addressing what is known, and not known, about these cancer-cases. I also present the causal hypothesis raised by Dr. David Brown and his colleagues at the nonprofit group, Environment and Human Health, Inc. (EHHI). Dr. Brown is the former Chief of Environmental Epidemiology and Occupational Health in the State of Connecticut, and has been quoted in the *Huffington Post* as saying, "I wouldn't put a child on one of these fields."

Next, I summarize what is known about cancer in adolescents, focusing on previously reported and investigated cancer-clusters.

I then return to EHHI's hypothesis, and point out its central flaws. In this context, I rely on measurements of chemicals emitted from crumb rubber, turf fibers, and/or synthetic turf field-systems, as well as on quantitative exposure-assessments and health risk-assessments that have been based on these measurements. All such assessments have found that plausible risks of developing cancer from playing on synthetic turf fields range from none to negligible.



## **Reports of cancer in young soccer players**

In May of last year, a Seattle, Washington TV station broadcast a story, "Toxic Turf? UW coach draws connection between turf and cancer." The story noted:

*University of Washington assistant soccer coach Amy Griffin sees a troubling connection between the turf and cancer among soccer players. Griffin [said] . . . that 13 players from the state of Washington were all diagnosed with rare types of cancer. Of those 13, 11 were goalkeepers. Griffin can't say why goalkeepers are getting cancer but she wonders if it could be caused by the crumb rubber, a kind of filler in turf fields. . . . 'Everyone says it's just a coincidence and kind of walks away, but the ratio of goalkeepers to field players is 15 to 1, 16 to 2, and I know plenty of goalkeepers that have cancers and I don't know many field players,' Griffin said . . .*

Other news reports followed, with additional cancers reported; but, to my knowledge, no systematic or scientific study of these cases has been performed or published.

Environment and Human Health, Inc. (EHHI), however, has presented some uncited information. At [http://www.ehhi.org/turf/cancer\\_cases\\_grow\\_0115.shtml](http://www.ehhi.org/turf/cancer_cases_grow_0115.shtml), in a recent (apparently January 2015) but undated posting, EHHI writes the following:

### ***Cancer cases among student athletes playing on synthetic turf continue to grow***

*There are now reported 95 cancers among student athletes who have played on synthetic turf fields. 65 are soccer goal keepers (this is not surprising as goal keepers are more heavily exposed to crumb rubber). The reported cancers are:*

*40 lymphomas  
16 leukemias  
7 Brain  
6 Thyroid  
7 Sarcomas*





*3 Testicular  
The rest are rare forms of  
cancers.*

*It is important to note the predominance of lymphomas and leukemias. 1,3 butadiene is connected to lymphoma and benzene is connected to leukemia. Both of these chemicals are present in rubber tires.*

*The United States itself is still not tracking cancers among students who have played on synthetic turf - the U.S. government has still not tested synthetic turf for anything but lead -- for which there is very little -- we still have no government official asking for a congressional hearing on synthetic turf - and the government is still promoting synthetic turf with rubber tire infill at both the state and the federal levels.*

*Synthetic turf fields are loaded with carcinogens - so no one should be surprised at the growing number of cancers among student athletes. The surprise is that government refuses to act.*

*When will state and federal governments step in and protect our children?*

And in an earlier posting, at [http://www.ehhi.org/turf/brown\\_stc\\_response.shtml](http://www.ehhi.org/turf/brown_stc_response.shtml), EHHI writes,

*. . . it is known that there are carcinogens and other toxic materials in the crumb rubber and possibly other infills, that children ingest the crumbs, track them into school rooms, school buses, private cars and homes.*

### **What is *not* known regarding these cancers in soccer players**

As noted above, these cancer-cases have not been reported on in any scientific journal, and no details have been reported. We do not know, for example, the ages, sexes, or races of any of the cases, nor do we know the specific forms of leukemia, lymphoma, or other cancer for any individual soccer-player.



Lacking this information, it is not possible to determine whether the cases constitute an actual cluster — that is, whether, as a group, they have experienced a significantly larger incidence of cancer-cases than would be expected, based on rates in the general population. EHHI notes a “predominance of lymphomas and leukemias,” but these are among the most common types of cancer that develop in children and adolescents (Ward *et al.*, 2014), and so are not necessarily noteworthy.

Moreover, although cancers in young people are not common, in 2014 in the U.S., almost 16,000 children and adolescents (from 0 to 19 years of age) were expected to have been diagnosed with some form of cancer (Ward *et al.*, 2014). Thus, learning about many cancer diagnoses in adolescents (I am assuming that most of these cases are in fact among adolescents) would not be entirely unexpected.

Suppose that these 95 cases do represent a cluster — that there are indeed significantly more cases of cancer among soccer players than one would “expect.” Does this mean that the cluster has an identifiable cause? In fact, no. As explained below, many cancer clusters have been evaluated in great detail, and for almost none has a cause ever been found.

### **Results of prior investigations of cancer clusters**

For several reasons, unusual coincidences of cancers among groups of younger people are noteworthy, and many of these have been extensively investigated. However, exhaustive study of such clusters in young people has never established an environmental or other exogenous cause: these clusters appear to be due instead to random bad luck (Caldwell, 1990; Gawande, 1999; Trumbo, 2000; Connecticut Department of Health, 2012).

Here, for example, is what noted epidemiologist Glynn Caldwell (1990) wrote toward the end of his long career:

*Beginning in 1961, the Centers for Disease Control investigated 108 cancer clusters and reported the findings in Epidemic Aid Reports. The clusters studied were of leukemia (38%), leukemia and lymphoma (30%), leukemia and other cancer combinations (13%), and all other cancer or combinations (19%). These clusters occurred in 29 states and five foreign countries . . .*



*Eight different data collection methods were used, often in combinations, and four types of laboratory methods on four different specimen types. Although 14 different categories of associations were reported, no clear cause was found for any cluster.*

*A priori*, then, an association between playing soccer on synthetic turf fields and risk of leukemia and lymphoma may be reported, but that does not mean that the association is causal, as opposed to coincidental.

Of course, some clusters of cancer in communities *are* due to shared environmental and carcinogenic exposures, so one cannot and should not over-generalize.

For example, clusters of skin cancer (and other diseases) have been repeatedly reported among groups of people who drink water that has been (naturally) contaminated with high concentrations of arsenic, and this is because such exposures are genuinely carcinogenic (IARC, 1980). Similarly, clusters of lung cancer and of mesothelioma occur in communities with naturally large amounts of erionite (a mineral similar to asbestos) in local rocks and soils, and, again, these associations are known to be causal (IARC, 1987).

Importantly, however, no community-based cluster of any of the cancers *at issue here* has been found to have an identifiable, external, chemical cause.

Another reason to doubt an external, chemical cause for adolescent cancers is this: the type of leukemia prevalent in childhood (namely, acute lymphocytic leukemia), all types of lymphomas, and brain tumors are *not known to be caused by cigarette smoking* (IARC, 2004). Of course, cigarette smoke is the most chemically complex and important cause of cancers of several tissues and organs (not only the lung) in the world (Surgeon General's Report, 2014; IARC, 2004). Since chronic exposure to such a potent mixture of carcinogenic chemicals does not cause the cancers at issue, then on what reliable basis could it be suggested that the much smaller doses of some of the same chemicals (potentially) emanating from used rubber particles could cause these cancers? I can think of none.

### **Some salient features of lymphomas, leukemias, and other cancers that occur in adolescents**

As noted above, EHHI reports that of the 95 cases of cancer in soccer players, 40 are cases of lymphoma. Lymphomas are not uncommon cancers: in 2014, more than



760,000 Americans were diagnosed with a form of lymphoma (Leukemia & Lymphoma Society, 2015). Among adolescents who develop cancer, lymphomas are the most common type (IARC, 2008). Dogs are also prone to developing lymphoma, with some breeds more likely to develop this cancer than other breeds (Teske, 1994).

There are many different types of lymphomas, and these vary substantially with regard to their prevalence, genetic pre-dispositions, other risk-factors, and clinical courses (Swerdlow *et al.*, 2008; Morton *et al.*, 2014). (This is one reason that the lack of detail about these cases makes their interpretation difficult). As suggested by the patterns of lymphomas in dog-breeds, and in some human families, some lymphoma-types have a strong genetic component (Bassig *et al.*, 2015); while others appear to be due to the significant alterations in the immune systems of people infected H.I.V., or afflicted with various autoimmune diseases (Cáceres *et al.*, 2010; Liang *et al.*, 2014). Although many hypotheses have been raised and investigated, to date, no environmental exposures have been established to cause lymphoma (IARC, 2008).

Leukemias also vary according to type, prevalence, etiologies, and clinical courses (Jandl, 1996). Although not specified by EHHI, as noted above, I suspect that most of the leukemias in the soccer players (at least, in the younger players) are the type known as acute lymphocytic leukemia (ALL). This is important because ALL — as opposed to a major leukemia-type in adults, namely acute myelogenous leukemia (AML) — is not known to be caused by overexposures to chemicals, such as benzene, nor by chronic exposure to the chemicals present in cigarette smoke (IARC, 2004).

More generally, no type of cancer in adolescents is known to be caused by overexposure to chemicals. Instead, many of these cancer-cases are known or believed to occur spontaneously, or to be caused by factors common to us all (Lynch, 2010; Matés *et al.*, 2012; Tomasetti *et al.*, 2013; Tomasetti and Vogelstein, 2015). Some cases of cancers in adolescents appear to be due to infections with viruses such as Epstein-Barr virus (EBV); and some are due to inherited genetic mutations (IARC, 2008).

### **EHHI's hypothesis with regard to crumb rubber and cancer**

Turning back to EHHI's apparent hypothesis with regard to crumb rubber and cancer, I begin by noting that it is of course true that tires are industrial products made with various potentially hazardous chemicals; and although tires *per se* are essentially inert,



finely crumbled tires can release small amounts of various chemicals. In particular, synthetic rubber products tend to have a distinctive smell, caused primarily by release of small amounts of volatile amines and organic sulfur compounds (Ambelong, 1963). These compounds are more odorous than they are toxic, and they are certainly not known or reasonably expected to pose a risk of cancer, regardless of the level of exposure.

Rather than focusing on actual, measured emissions from crumb rubber, EHHI raises the specter of two other chemicals, which, at very high levels of exposures, can indeed cause cancer.

As quoted above, EHHI writes:

*It is important to note the predominance of lymphomas and leukemias [among the 95 cases]. 1,3 butadiene is connected to lymphoma and benzene is connected to leukemia. Both of these chemicals are present in rubber tires.*

These statements are misleading in several ways. First, there is nothing surprising about a “predominance of lymphomas and leukemias” among young people: as noted above, these are the most common cancers in adolescents. Indeed, it would be striking if these cancer types were *not* prevalent in any random group of adolescents with cancer.

Second, the implication that crumb rubber is a significant source of people’s exposures to the chemicals 1,3-butadiene and benzene is incorrect. It is true that 1,3-butadiene is *used* to make synthetic rubber (for tires and other products), but it is also essentially all *used up* in this process, in that it reacts with another chemical, styrene, to form a stable polymer (styrene-butadiene rubber). This stable polymer is no more a significant source of exposure to 1,3-butadiene than, say, a thoroughly baked cake is a significant source of exposure to raw eggs.

Nor do tires contain anything more than perhaps trace amounts of benzene. While it is the case that some tire building-machine operations rely on solvents that do contain small amounts (less than 1%) of benzene, there is neither evidence nor reason to maintain that tires would absorb and retain anything more than trace amounts of



benzene.

It is not surprising, then, that studies of ambient air in contact with crumb rubber in-filled synthetic turf fields have reported either (i) no detectable concentrations of 1,3-butadiene or benzene, or (ii) only the very low-level concentrations found throughout suburban and urban environments (Dye *et al.*, 2006; Norwegian Pollution Control Authority, 2006; Moretto, 2007; Denly *et al.*, 2008; Lim and Walker, 2009; Li *et al.*, 2010; Schilirò *et al.*, 2012). As noted by researchers Schilirò *et al.* (2012), “On the basis of environmental monitoring, artificial turf football fields present no more exposure risks than the rest of the city.” Their conclusions were based on measurements in ambient air of benzene and the related compounds, toluene and xylenes, as well as on measurements of inhalable particles (in the size ranges of PM<sub>10</sub> and PM<sub>2.5</sub>) and of polycyclic aromatic hydrocarbons (PAHs).

Third, as just suggested, all of us are exposed to very small concentrations of both 1,3-butadiene and benzene in ordinary outdoor air, every day. This is because both chemicals are present in the exhaust from automobiles and from several other common sources. However, the evidence that benzene can cause leukemia (and again, only AML, and not ALL of childhood, and not lymphoma) does not come from these common, low-level, environmental exposures, but instead from massive exposures experienced by workers inside poorly ventilated factories, prior to the institution of modern industrial hygiene (Graham *et al.*, 1988). It is entirely misleading to conflate these genuinely dangerous, historical, occupational settings with any outdoor environments, even on heavily trafficked roads, for example, let alone on playing fields.

Finally, although EHHI claims that 1,3-butadiene “is connected to lymphoma,” in fact it, like benzene, is known to cause leukemia (AML) and not lymphoma; and, again, it is known to do so in over-exposed factory workers (Delzell *et al.*, 1996), but not known to do so in the public at large, which experiences vastly smaller, environmental exposures.

### **Theoretical risks of cancer from crumb rubber in-filled synthetic turf fields**

Because some potentially carcinogenic chemicals are present in crumb rubber (as they are in ordinary dirt), several studies have sought to estimate the degree of health-risk, if any, associated with these chemicals.



For example, Van Rooij and Jongeneelen (2010) studied young-adult male soccer players following intensive contact with crumb rubber-filled synthetic turf. The researchers sought to determine whether this contact would lead to increased exposures to polycyclic aromatic hydrocarbons (PAHs). The researchers found that it did not. They concluded, “If there is any exposure, then the uptake is very limited and within the range of uptake of PAH from environmental sources and/or diet.” This was the case despite the fact that the athletes “had black residue of crumb dust on knees, hand palms and elbows . . . [confirming] that skin contact had occurred to dust of the tire crumb rubber.”

A recently published study from New Jersey’s state medical school (The Robert Wood Johnson Medical School) provides additional information. In particular, Pavilonis and colleagues (2014) subjected samples of both new and turf field-aged crumb rubber to extractions with solutions of synthetic sweat, synthetic lung fluid, and synthetic digestive fluid. They analyzed the types and amounts of chemicals that appeared in these synthetic biofluids, and then assessed whether children’s and adults’ exposures to these chemicals would be risky. Their results were negative: that is, health risks to children and adults from extensive contact with crumb rubber were found to range from none to negligible. Small amounts of potentially carcinogenic metals were detected in the crumb rubber-extracts, but the theoretical risks associated with these were all less than one in one million, “and therefore risk was considered negligible.”

Earlier scientific studies and health risk-assessments have reported similar results. For example, in 2003, Birkholz and colleagues published their study, “Toxicological evaluation for the hazard assessment of tire crumb for use in public playgrounds.” Aggressive extraction of crumb rubber and testing of that extract revealed no significant toxic or mutagenic activity. (Mutagenic activity is an *in vitro* surrogate for ability to initiate cancer). Based on these and other results, the authors wrote, “We conclude that the use of tire crumb in playgrounds results in minimal hazard to children and the receiving environment.”

In 2006, the Norwegian Institute of Public Health published their report, “Artificial turf pitches – an assessment of the health risks for football players.” These researchers focused on indoor fields because, of course, this is the setting in which air emissions would be much more concentrated, relative to outdoor fields. Nonetheless, the Institute



concluded:

*Worst case calculations based on air measurements carried out by NILU [Norwegian Institute for Air Research] and exposure values from the Norwegian Institute of Public Health indicate that training in sports halls does not cause any increased risk of leukaemia as a result of benzene exposure or any elevated risk as a result of exposure to polycyclic aromatic hydrocarbons.*

*On the basis of the exposures which have been calculated in connection with the use of indoor halls with artificial turf in which recycled rubber granulate is used, there is no evidence to indicate that the use of such halls causes an elevated health risk. . . . It has been concluded that exposure to benzene and PAHs in the quantities in which they have been measured in the halls will not cause any increased risk of cancer in people using the halls.*

In 2007, the Dutch researcher Hoftstra published his report, “Environmental and Health Risks of Rubber Infill. Rubber Crumb from Car Tyres as Infill on Artificial Turf.” His analysis was based on an extensive review of prior studies, as well as on the generation of new test data from fresh and weathered samples of rubber infill. Hofstra wrote:

*Based on the available literature on exposure to rubber crumb by swallowing, inhalation and skin contact and our experimental investigations on skin contact we conclude that there is not a significant health risk due to the presence of rubber infill for football players on artificial turf pitch with rubber infill from used car tyres.*

Finally, the Connecticut Department of Public Health (CT DPH) has published three peer-reviewed studies of synthetic turf fields (Ginsberg *et al.*, 2011a and 2011b; Simcox *et al.*, 2011), and has recently (January 20, 2015) issued a memorandum to local health departments and districts in the State. In this, CT DPH (2015) affirms its “position that outdoor artificial turf fields do not represent an elevated health risk.” The Department notes:

*. . . CT DPH finds no scientific support for a finding of elevated cancer risk*





*from inhalation or ingestion of chemicals derived from recycled tires used on artificial turf fields. . . . federal and state authorities have taken seriously the concerns that artificial turf fields may present a health risk due to contaminants in recycled rubber. The best way to investigate these concerns is via an exposure investigation. Studies conducted in Connecticut and elsewhere have shown a very low exposure potential, less than from typical outdoor sources of air pollution. The current news reports of a list of soccer players with cancer does not constitute a correlation or causality and thus raises a concern that currently lacks scientific support. Thus, the CT DPH position expressed in 2011 at the conclusion of the Connecticut study, that outdoor artificial turf fields do not represent an elevated health risk, remains unchanged.*

## Conclusion

Overall, then, for several reasons, I find no reliable basis for the notion that crumb rubber in-filled synthetic turf fields pose a significant risk of cancer. Several groups of investigators, from academia, government, and consulting firms, have performed environmental monitoring and/or modeling studies of crumb rubber and synthetic turf fields, and have reached the same conclusion. I find no merit in EHHI's apparent hypothesis as to how and why soccer players have developed cancer at excess rates. If these players do constitute a cancer-cluster — and, again, one cannot say one way or the other with the limited information at hand — then this cluster has almost certainly arisen entirely by chance, as have essentially all of the others.

\* \* \* \* \*

Thank you again for the opportunity to have considered this matter. Please feel free to call or email me with any questions or concerns.

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May 4, 2015

Barnes Johnson, Director  
Office of Resources Conservation and Recovery  
U.S. Environmental Protection Agency  
1200 Pennsylvania Avenue, NW (5301P)  
Washington, DC 20460-0001

Dear Barnes,

We very much appreciated the opportunity to update you and others at EPA on the state of the synthetic turf industry, our activity in various state venues, and the scientific studies we have identified that support the safety of crumb rubber. As you know, we have been open and transparent in providing the Agency with science based information that will support EPA's mission, and particularly the efforts of the Office of Resources Conservation and Recovery to continue its highly productive program of recycling crumb rubber materials.

As we discussed at the meeting, misinformation propagated through the rapid-fire broadcast and cable news media has distorted value and safety of our product without regard to the science supporting the safety of the product.

We appreciate your suggestion that we encourage further scientific studies that would specifically address the potential relationship of cancer and crumb rubber through an epidemiological study conducted by an independent organization representing state health agencies such as the Association of State and Territorial Health Officials (ASTHO). As we initiate our request with ASTHO, we would expect EPA to help coordinate this research through the excellent resources of your agency. Hopefully, the results of such a collaborative study would provide EPA with the basis to reaffirm the safety of crumb rubber.

We cannot understate the seriousness of this issue to both our industry and to the mission of your program.

As you could clearly sense from the intensity of our positions, our companies, representing the vast majority of the industry, are committed to aggressively pursuing the very constructive actions you propose. With all of this we trust EPA will take a positive position on this issue to enable science to prevail – as it should. To that extent, it would very much appreciate it if you your colleagues could provide us a summary of specific actions our industry would need to do to enable the EPA to reaffirm its 2009 position that synthetic turf and crumb rubber is does not present a safety hazard to consumers.

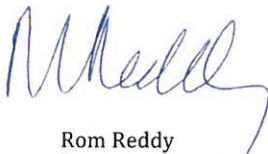
We intend to reach out to ASTHO as well as other independent state agencies to perform such studies. As we requested at the meeting today, we hope that EPA will make public statement to eliminate any doubt on the safety of synthetic turf and crumb rubber.

We look forward to working with you and your staff.

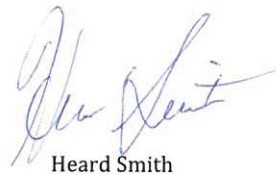
Sincerely,



Darren Gill  
Vice-President, Marketing  
FieldTurf



Rom Reddy  
Managing Partner  
Sprinturf



Heard Smith  
President  
Astroturf

